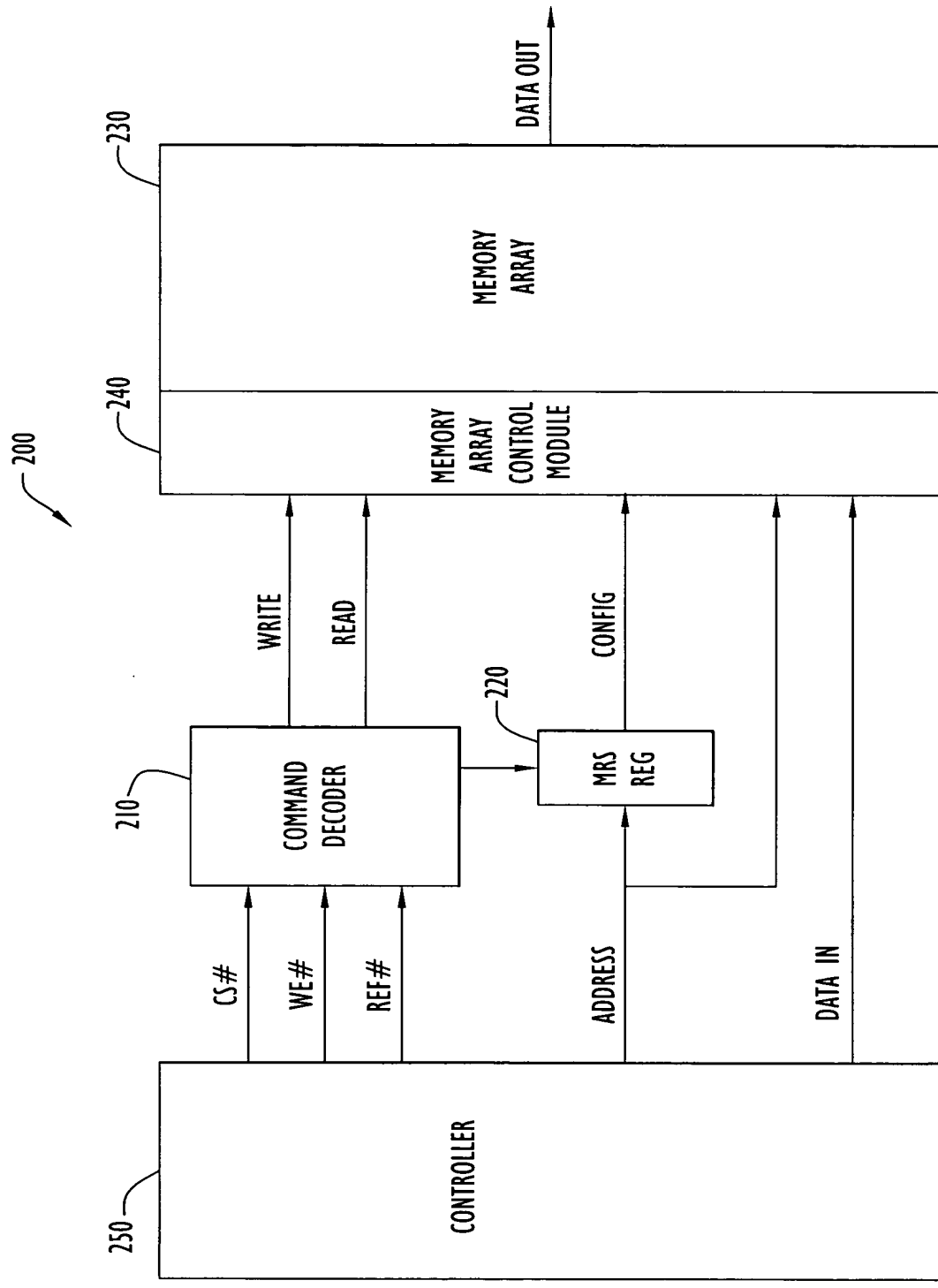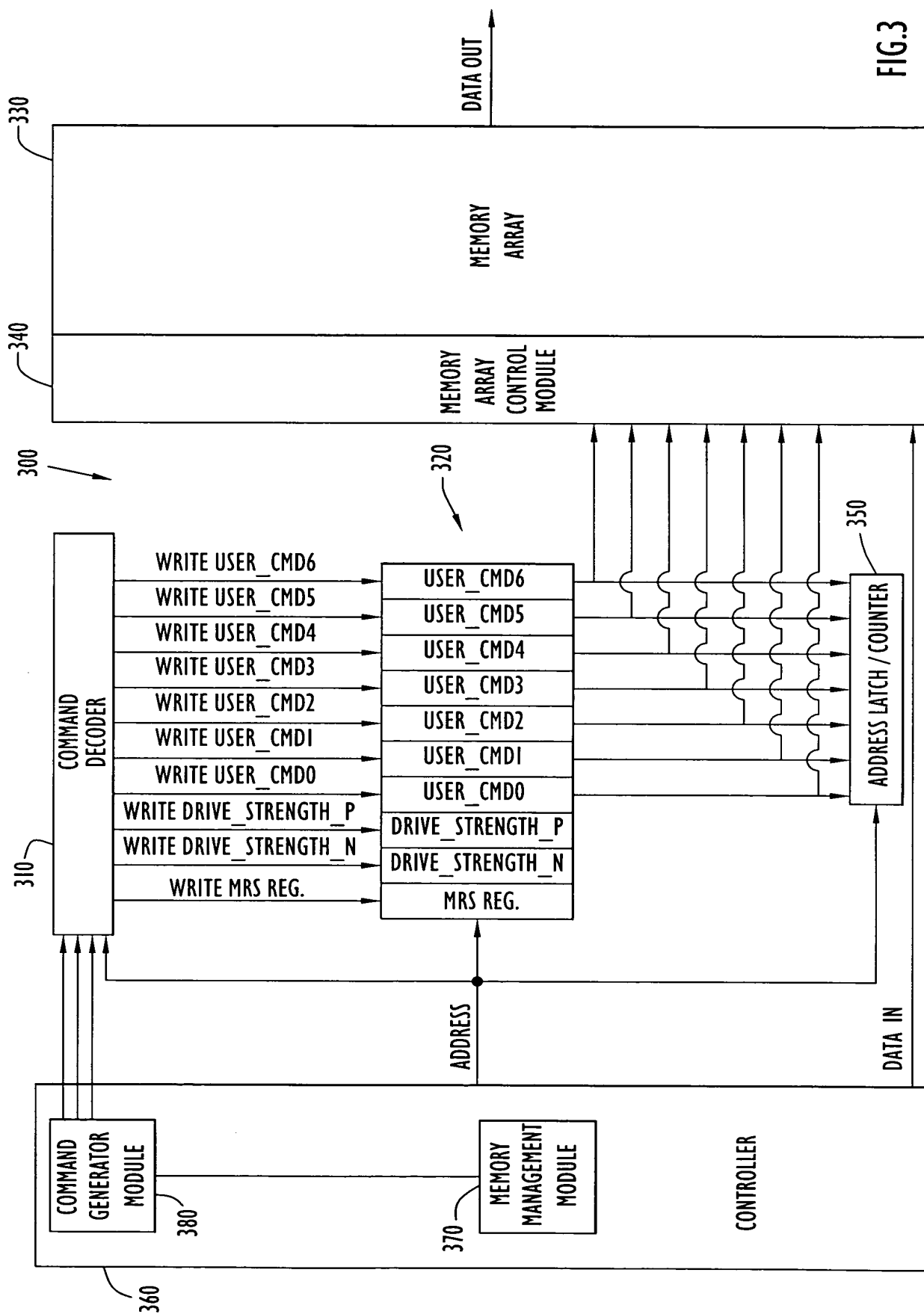| CYCLE	OPERATION	BANK
0	READ	0
1	WRITE	1
2	READ	2
3	WRITE	3
4	PAUSE	
5	WRITE	0
6	READ	1
7	WRITE	2
8	READ	3
9	PAUSE	

FIG.1

FIG.2

CONTROLLER 250

CS#
WE#
REF#
ADDRESS
DATA IN

COMMAND DECODER 210

MRS REG 220

WRITE
READ
CONFIG

MEMORY ARRAY CONTROL MODULE 240

MEMORY ARRAY 230

DATA OUT

200

FIG.3

COMMAND DECODER 310

WRITE USER_CMD6
WRITE USER_CMD5
WRITE USER_CMD4
WRITE USER_CMD3
WRITE USER_CMD2
WRITE USER_CMD1
WRITE USER_CMD0
WRITE DRIVE_STRENGTH_P
WRITE DRIVE_STRENGTH_N
WRITE MRS REG.

USER_CMD6
USER_CMD5
USER_CMD4
USER_CMD3
USER_CMD2
USER_CMD1
USER_CMD0
DRIVE_STRENGTH_P
DRIVE_STRENGTH_N
MRS REG.

320

300

ADDRESS

ADDRESS LATCH / COUNTER
350

DATA IN

MEMORY ARRAY CONTROL MODULE
340

MEMORY ARRAY
330

DATA OUT

COMMAND GENERATOR MODULE
380

MEMORY MANAGEMENT MODULE
370

CONTROLLER
360

```
              ┌─────────────────────────┐
              │   SEND COMMAND BITS     │        400
              │ FROM CONTROLLER TO COMMAND │      ╭─
              │ DECODER OF MEMORY DEVICE │
              └─────────────────────────┘
                         │
                         ▼
                    ◇◇◇◇◇◇◇           410
                   ◇   DO   ◇         ╭─
                  ◇ COMMAND  ◇
                 ◇ BITS INDICATE "PROGRAM" ◇──NO──►  ┌──────────────────────┐      480
                  ◇ COMMAND ◇                        │  SEND COMMAND IDENTIFIER │    ╭─
                   ◇   ?   ◇                         │ FROM COMMAND DECODER  │
                    ◇◇◇◇◇◇◇                          │    TO MODE MODULE     │
                      │                              └──────────────────────┘
                     YES          420                          │            490
                      │           ╭─                           ▼           ╭─
                      ▼                           ┌────────────────────────────────┐
    ┌────────────────────────────────────────┐   │  SEND USER-DEFINED ENCODED COMMAND │
    │ ADDRESS WORD CONTAINING PROGRAM COMMAND │   │   (R/W, BURST LENGTH, LATENCY)   │
    │ OPERATIONAL CODE (PROGRAM WORD) IS      │   │       TO MEMORY ARRAY CONTROL    │
    │ SUPPLIED TO MODE MODULE AND COMMAND DECODER │ │ MODULE AND / OR ADDRESS LATCH / COUNTER │
    └────────────────────────────────────────┘   └────────────────────────────────┘
         │                          │
    430─╮│                          │
        ▼                           ▼
┌──────────────────────────────┐  ┌──────────────────────────┐  450
│  LOWER BITS OF ADDRESS DECODED BY │  │  UPPER BITS OF ADDRESS   │  ╭─
│ COMMAND DECODER FOR FIXED COMMANDS │  │ SPECIFY USER-DEFINED COMMAND │
└──────────────────────────────┘  │      TO BE PROGRAMMED     │
    440─╮                          └──────────────────────────┘
        │                                      │
        ▼                                      ▼
┌──────────────────────────────┐  ┌──────────────────────────┐
│  IF FIXED COMMAND INDICATED,  │  │   IF USER-DEFINED COMMAND │
│   SEND FIXED COMMAND          │  │    IS TO BE PROGRAMMED     │
│  INDICATOR TO MODE MODULE     │  │  NEXT ADDRESS WORD CONTAINS │  460
└──────────────────────────────┘  │ USER-DEFINED ENCODED COMMAND │  ╭─
                                   │ (R / W, BURST LENGTH, LATENCY) │
                                   └──────────────────────────┘
                                               │
                                               ▼
                                   ┌──────────────────────────┐  470
                                   │   LOAD NEXT ADDRESS WORD  │  ╭─
                                   │ INTO SECTION OF MODE MODULE │
                                   │ CORRESPONDING TO USER-DEFINED │
                                   │  COMMAND BEING PROGRAMMED  │
                                   └──────────────────────────┘
```
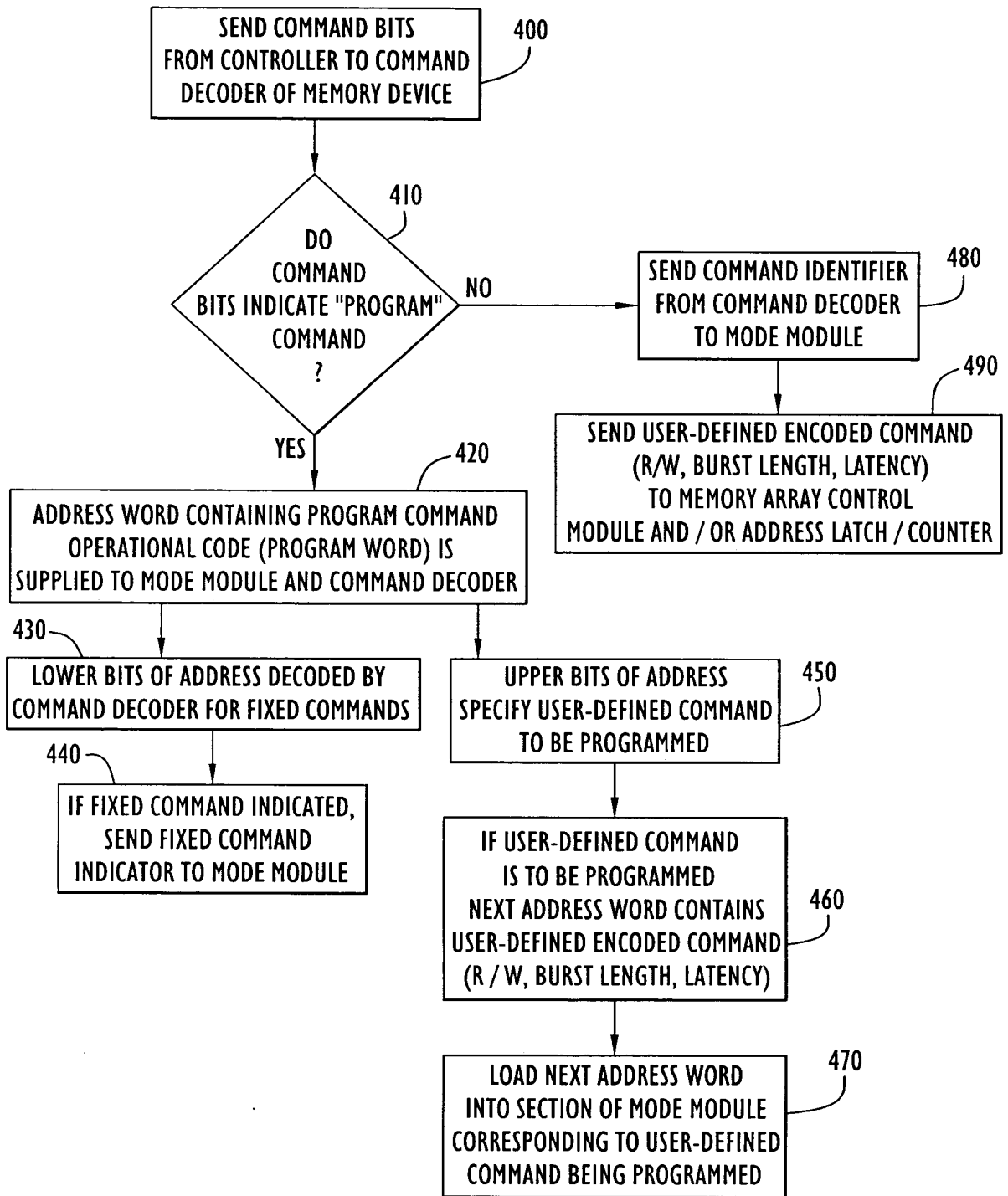
FIG.4

CMD[2:0]	COMMAND	ADDRESS
0	FIXED_COMMAND/PROGRAM	OP_CODE
1	USER_CMD0	A
2	USER_CMD1	A
3	USER_CMD2	A
4	USER_CMD3	A
5	USER_CMD4	A
6	USER_CMD5	A
7	USER_CMD6	A

FIG.5

ADDRESS	COMMAND	DESCRIPTION
0	NOP	CHIP DESELECT / NO OPERATION
1	AUTO REFRESH	AUTO REFRESH COMMAND
2	MRS	MODE REGISTER SET
3	N_DRIVE	DRIVE_STRENGTH_N
4	P_DRIVE	DRIVE_STRENGTH_P
5-15	RESERVED	X
16	USER_CMD0	COMMAND_DEFINITION
17	USER_CMD1	COMMAND_DEFINITION
18	USER_CMD2	COMMAND_DEFINITION
19	USER_CMD3	COMMAND_DEFINITION
20	USER_CMD4	COMMAND_DEFINITION
21	USER_CMD5	COMMAND_DEFINITION
22	USER_CMD6	COMMAND_DEFINITION
23-MAX	RESERVED	X

FIG.6

BITS	DESCRIPTION
0	0 = DLL DISABLED 1 = DLL ENABLED
1	0 = ADDRESS NON-MULTIPLEXED 1 = ADDRESS MULTIPLEXED
2	0 = 50 OHM INTERNAL CALIBRATION 1 = EXTERNAL CALIBRATION RESISTOR
3	0 = ON DIE TERMINATION DISABLED 1 = ON DIE TERMINATION ENABLED
4-MAX	RESERVED

FIG.7

BITS:	DESCRIPTION:
3:0	READ LATENCY
7:4	WRITE LATENCY
11:8	BURST LATENCY
15:12	COMMAND
20:16	RESERVED

FIG.8

ENCODING	READ / WRITE LATENCY
0-1	RESERVED
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9-15	RESERVED

FIG.9

ENCODING	BURST LENGTH
0	2
1	4
2	8
3	16
4	32
5	64
6	128
7-14	RESERVED
15	FULL PAGE

FIG.10

ENCODING	COMMAND
0	TERMINATE
1	READ
2-8	RESERVED
9	WRITE
10-15	RESERVED

FIG.11